DEPARTMENT OF THE AIR FORCE
Headquarters Space Division (AFSC)
PO Box 92960, Worldway Postal Center
Los Angeles CA 90009-2960

SD REGULATION 55-1

30 May 1985

Operations

SATELLITE POSITION MANAGEMENT

This regulation directs program directors and managers to adjust satellite development and deployment plans to avoid orbital positioning problems. This directive applies to initial satellite positioning and subsequent repositioning.

1. **Policy.** Program offices and operators must address positioning concerns in their planning. Satellites are a vital resource for the support of US civil and military operations. Maintaining acceptable distance between satellites is necessary to reduce the chance of mutual radio frequency interference, debris damage from other space systems and damage from collision with another satellite. Satellite bunching is already a concern in some orbital regions. At geosynchronous altitude, many satellite programs use the same regions of space for best access to ground stations and mission data. At lower orbits, potential conflicts become more complex with fixed and maneuvering satellites. The level of congestion must be considered when planning final orbit location or transfer to another orbit. Program managers should use RAND report R-3046-AF, Techniques for Analysis of Spectral Orbital Congestion in Space Systems, to assist them with obtaining global compatibility in satellite positioning.

2. **Positioning Concerns.** The satellite population continues to grow from a greater military and civilian need for space systems which support communications, weather forecasting, attack warning, and navigation. Increased dependence on these systems and conflicting demands for beneficial orbit locations in space dictate careful management of satellite positions. There are three basic concerns of satellite position management:

a. **Radio Frequency Interference (RFI).** The possibility of RFI has increased with the proliferation of satellites on orbit. Spectrum crowding in a number of frequency bands is an international issue. A special agency of the United Nations, the International Telecommunications Union (ITU), regulates the worldwide use of telecommunications to avoid interference between radio stations of different countries and to improve the use of the radio spectrum. SD program offices coordinate with the ITU for frequency assignment by applying through USAF Frequency Management Center channels. The ITU then allocates and registers radio frequency assignments. The ITU also compiles and publishes the Radio Regulations,

Supersedes SDR 55-1, 15 September 1983.
(See signature page for summary of changes.)
No. of Printed Pages: 4
OPR: SD/XR (Major L. Jackson)
Approved by: Colonel Gaylord B. Green
Editor: O. K. Ormond
Distribution: F: X:
HQ AFSC/XR....1

Volume I (which includes the table of international frequency allocations), and the Appendices to the Radio Regulations, Resolutions, and Recommendations, Volume II.

b. Nuclear Collateral Damage. Space system planners and users must consider that satellites are vulnerable to possible attack by anti-satellite weapons. Satellite positioning must therefore be concerned with system hardness levels and projected threats as well as primary mission requirements. The Cheyenne Mountain complex is responsible for warning of attacks and coordinating satellite defense. Among its major concerns about protecting priority resources is the need to avoid physical and electromagnetic pulse damage from a nuclear attack on adjacent satellites. Space system managers should address nuclear hardness levels according to AFR 80-38, Management of the Air Force Survivability Program, and should also consider spacecraft location assignment to minimize collateral damage.

c. Physical Damage from Collision. The potential for satellite collision increases as more space systems are placed in orbit. Geosynchronous, sunsynchronous, polar, and equatorial orbits offer operational advantages which lead to a concentration of satellites in these orbital regions. At geosynchronous altitudes, active satellites maintain fixed longitudinal station-keeping control while inactive satellites and debris drift around the orbit or swing about geopotential stable points. Many of the objects in geosynchronous orbit are currently being tracked by ground stations, however, a lot of untracked pieces of space debris are believed to pass regularly through geosynchronous orbit altitudes. At lower altitudes, the possibilities of collision have increased as more payloads, debris from satellite launches, and breakup of orbiting systems add to the number of objects in space. Also, the frequent launch of the Space Transportation System (STS) now adds urgency to the need to avoid collision hazards at the lower altitudes. Although the likelihood of one operational satellite colliding with another satellite or with a piece of debris is small at present, it will grow with the proliferation of space objects, increased system size, and extended on-orbit lifetimes. Future planning must minimize the possibility of collision.

3. **Responsibilities.**

a. The Space Division Office of Plans (SD/XR) will:

(1) Serve as the SD office of primary responsibility for policy issues related to satellite position management.

(2) Advise the SD Commander on matters affecting satellite position management policy.

(3) Coordinate satellite position management policy and planning with higher headquarters, SD/CG, SPACECMD/XP, and other cognizant organizations.

(4) Elevate for resolution those operational satellite position management problems for which SD does not have the final decision authority.

(5) Correlate information on satellite station keeping capabilities, nuclear damage vulnerabilities, and radio frequency separation requirements.

b. The Air Force Satellite Control Facility (AFSCF) will:

(1) Establish procedures for determining if a satellite under AFSCF support will approach another space object within the minimum conditions established under (6) below. Establish procedures to ensure action be taken to avoid potential hazards.

(2) Maintain information on satellite station-keeping capabilities.

(3) Alert satellite users, operators, the SPADOC, SD/CG, and affected system program offices to potential hazard situations and advise agencies when requests are submitted to move a satellite to a new position.

(4) Assist space system program directors and managers in determining the initial and any subsequent placement of satellites as well as the time and parameters of orbital transfers.

(5) Ensure that a minimum safe separation distance between satellites is maintained.

(6) Determine separation distance criteria to minimize RF interference, collateral damage, and collision hazards.

(7) Provide SD/DCU with appropriate information updates for the Electromagnetic Compatibility Analysis Center (ECAC) data base.

(8) Forward to SD/XR those position management problems for which SD does not have final decision authority.

c. The Deputy for Space Defense Systems (SD/YN) will:

(1) Serve as the SD focal point for supporting program directors and managers in determining orbital separation to ensure satellite survivability.

(2) Maintain information on satellite nuclear hardening criteria.

(3) Coordinate SD satellite hardening criteria with the Air Force Nuclear Criteria Group

(4) Coordinate satellite position management criteria and procedures with space defense operations and planning. (SPACECMD/DO/XP.)

d. The Directorate of Communications Electronics (SD/DC) will:

(1) Serve as the primary point of contact for program directors and managers with the ECAC space systems data base.

(2) Maintain information on satellite radio frequency separation requirements.

(3) Assist in determining recommended orbital separation and methods to reduce the risk of mutual RF interference.

(4) Establish procedures for providing periodic space system information updates to the ECAC data base.

(5) Establish procedures for allowing ready program office access to the ECAC data base, to include access by contractors approved by the program directors.

e. The Deputy Commander for Space Systems (SD/CG) will:

(1) Support SD/DC and program offices as required to ensure efficient electromagnetic compatibility analyses.

(2) Review satellite positioning and repositioning requests before submission to SPACECMD for approval.

(3) Act as the SD focal point to resolve satellite positioning/repositioning problems elevated by program managers.

(4) Forward to SD/XR those satellite position management problems for which SD does not have final decision authority.

f. Satellite Program Directors and Managers will:

(1) Ensure consideration of satellite position management problems during all phases of satellite program planning. Evaluate the best future location for their satellites. Ensure that proper consideration is given to risks, costs, and mission impacts in any contemplated collision avoidance activity. Elevate problems to SD/CG's attention as soon as possible.

(2) Provide longitudinal station-keeping limits, damage separation criteria, and RF separation requirements of program satellites (current and planned) to AFSCF/VO. Assist AFSCF/VO in the resolution of any overlapping limits.

(3) Coordinate with SD/YNV on recommended orbital separation distances required for minimizing collateral damage.

(4) Coordinate with SD/DCU on frequency assignment and satellite frequency interference potential. Provide SD/DCU with appropriate:

(a) Information updates for the ECAC data base.

(b) Data for the ITU Radio Regulation Appendices.

(5) Provide, as required, intrasystem and intersystem electromagnetic compatibility analyses to SD/CG for specific spacecraft to ensure compatibility with the intended operational environment.

(6) Assist SD/CF in developing options and procedures for disposing of upper stage expended hardware and debris outside the main traffic lanes of geosynchronous and other orbits. Assess the use of operational procedures and satellite design options to minimize hazards to operational satellites by moving satellites at the end of their useful lifetime.

(7) Coordinate with SD/CF to ensure the satellite's launch and orbital insertion sequence minimizes the chance of collision with its own upper stage, expended hardware, and other satellites or space debris.

(8) Forward to SD/XR those satellite position management problems for which SD does not have final decision authority.

g. The Deputy Commander for Space Launch and Control Systems (SD/CF) and SAMTO/CC jointly will:

(1) Ensure consideration of satellite position management planning during all phases of launch vehicle program planning and operations.

(2) Ensure that proper consideration is given to risks, costs, and mission impacts in any contemplated collision avoidance activity.

(3) Coordinate with SD/DCU to ensure minimum frequency interference during launch and satellite deployment operations. Provide SD/DCU with appropriate information updates for the ECAC data base.

(4) Develop options and procedures for disposing of upper stage expended hardware and debris outside the main traffic lanes of geosynchronous and other orbits.

(5) Assess the use of operational procedures and launch vehicle design options to minimize hazards to operational satellites during ascent and orbit insertion and to ensure minimum insertion of orbital debris.

(6) Ensure the satellite's launch and orbital insertion sequence minimizes the chance of collision with its own upper stage, expended hardware, and other satellites or space debris. Present results of evaluation at the Mission Readiness Review.

(7) Forward to SD/XR those satellite position management problems for which SD does not have final decision authority.

OFFICIAL

FORREST S. McCARTNEY, Lt Gen, USAF
Commander

NORMA L. K. MOKUAU, Lt Col, USAF
Director of Administration

SUMMARY OF CHANGES

Updates organization responsibilities. Amplifies staff agency and program office tasks to ensure collision avoidance and system compatibility with electromagnetic environment.